

Multiplayer online role-playing as information retrieval and system use: An ethnographic study

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Abstract

Purpose. *This article expands the research of games as information systems. It illustrates how significant parts of massively multiplayer online role-playing function like information retrieval from a library database system.*

Methodology. *By combining ideas from earlier contributions on the topics of game environments as information systems, the article explores how gameplay connects to information retrieval, restricted content access, and information system structure. The article then proceeds to examine this idea through an ethnographic study conducted in World of Warcraft during 2012-2016.*

Findings. *By discussing how multi-player digital game play is a form of information retrieval, the article shows that players enjoy the well-restricted access to information that is a constitutive element of gameplay. Examining controlled access, procedural literacies and emphatic keywords, the article finds that content relevances and system use may be influenced by hedonic concerns rather than task efficiency.*

Originality. *The study of retrieval issues related to gaming enriches our knowledge on inferences in retrieval. It shows that people may prefer that their access to information be limited, in order to make system use more interesting.*

Keywords: collaborative information retrieval, games, information systems, MMORPGs, system access, systems ethnography, user interfaces.

Introduction

This article investigates digital game play as a type of information interaction, particularly information retrieval. Its focus is on information in massively multiplayer online role-playing games (MMORPGs), games which can have player numbers in the millions and include types of content that require the simultaneous coordination of dozens of people to fully access and to successfully complete (Harviainen and Vesa, 2016). These games are types of virtual worlds that their players use primarily for hedonic purposes (Goh and Yoon, 2011), in some cases also for other reasons such as professional play (e.g., eSports, gold farming; Lehdonvirta and Castronova, 2014). The enjoyable use of such worlds usually requires social interaction and the efficient, enjoyable retrieval of systemic content. The central purpose of the work is to test the hypothesis of Harviainen and Savolainen (2014) that at the core of MMORPG play is indeed a system interaction, which consists of information retrieval done with game elements as its “keywords”, and to describe how that so far only shallowly discussed retrieval takes place.

Following Vakkari (1999), this article considers information retrieval to be “*the use of an information system for obtaining relevant information for a purpose (e.g. a task)*”, while taking also into account Ingwersen and Järvelin’s (2005, p. 385) view of retrieval as “*[t]he processes involved in representation, storage, searching, finding, filtering and presentation of potential information perceived relevant to a requirement of information desired by a human user in context*” (emphases in the original). It likewise follows Harviainen and Hamari (2015) in defining “information” as “*the potential message content in any piece of data, ranging from verbal statements to physical objects.*

It is selectively ignored or appropriated into knowledge structures by persons seeking or encountering it”¹. In any multiplayer online game are present several overlapping information systems, which together form the whole game (Harviainen and Savolainen, 2014). These information systems all rely on an underlying retrieval system, based on game code and algorithms. That retrieval system is the subject of this article.

Comprehending how system access and information retrieval take place in the context of games and gaming increases our understanding of game enjoyment, game-related information practices, hedonic system use, and the way people behave during play or in relation to it (see e.g., Consalvo, 2007; Harviainen and Hamari, 2015; Jørgensen, 2016; Sköld et al., 2015). Since play has been noted as an important factor in finding information systems useful (e.g., Agarwal and Karahanna, 2000), we believe that an understanding of how game systems facilitate play as information retrieval directly contributes to also wider knowledge on information system access and use.

By exploring the suggestions of previous research with the results of an ethnographic study conducted in 2012-2016, this article considers the research question “**how do multiplayer digital games function as information retrieval systems?**”

The article first describes existing views on MMORPGS as information systems, then turns to theories of play as retrieval and the optimization thereof. Then, it discusses the ethnographical study methods used, followed by examples of play-as-retrieval from actual play in World of Warcraft. The work ends with a short discussion on systemic structure and some conclusions on implications of the research.

MMORPGs as Information Systems: Core Concepts from Existing Research

To function as meaningful play, MMORPGs require several interconnected information systems: 1) the retrieval core (discussed in this article), 2) a social system formed by the players and their play, and 3) external information sources (i.e., analytic and descriptive paratexts on game structure and play, including blogs, forums and videos) that together can be considered to be an external information system (Harviainen and Savolainen, 2014). Without understanding social interactions in virtual worlds, it is not possible to understand their technological capabilities (Davis et al., 2009). In gaming-oriented virtual worlds, the focus of play is usually in players overcoming challenges presented by the system, i.e., the game's core algorithms, which is a type of information retrieval and use. Multiplayer online games are a kind of data polyrepresentation (as per Larsen et al., 2006) that combines also sources and representations from outside the information system (e.g., task-based relevances assigned by other players in a group). The focus of this article, as explained below, is on interaction with the primary retrieval system (see e.g., Harviainen and Savolainen, 2014).

During MMORPG play, players access encoded game content the same way in which the use of database systems takes place. Game elements, instead of words, are its retrieval keywords (as per Saracevic, 1996; see Harviainen and Hamari, 2015). This is an access type also known from e.g., hypermedia retrieval (Steichen et al., 2012). The company that produces the game functions as both the author and the selector of any retrieval process within the system (as per Ingwersen and Järvelin, 2005, p. 271). In other words, the company is responsible for the availability of, access to, and nature of the retrievable content. It fundamentally defines the context relevance of each bit of information during play, and create recommendations on what to retrieve and when. The relevances are based on e.g., quests that need to be resolved (Snodgrass et al., 2016), foes that are meant to be defeated (Vesa, 2013; Williams et al., 2006), and crafting-recipes with which virtual objects can be turned into other virtual objects (Lehdonvirta and Castronova, 2014).

In MMORPGs, play-retrieval tasks tend to intentionally contain practically all of the elements listed by Byström and Järvelin (1995): repetitiveness, analyzability, determinability before resolution, outcome novelty, and multiple paths to the same goals. Players themselves retrieve new tasks (e.g., monsters to fight), of increasing complexity, because it is enjoyable for them to do so – and because the game has been designed to encourage such retrieval (Chen, 2009; 2012). Furthermore, the more the games grow in scope and scale, the more complicated task resolution becomes. This is because factors such as social and system-external information become increasingly relevant (Harviainen et al., 2012). Social information networks can be crucial for the execution of tasks, even as those tasks consist of just content retrieval. This is highly visible in MMORPGs.

Because of the prominence of the social level of play, much of earlier information systems research on MMORPGs has focused on the social aspects of play (e.g., Martin and Steinkuehler, 2010; Shen et al., 2014; Warmelink, 2014). At the same time, designers have attempted to focus players' information needs to the task resolution level. This is because, as pointed out by Vakkari (1999), inefficient problem formation by information searchers leads to the searchers becoming ill-informed. For a commercial game, that means a high risk of player attrition and a lower conversion rate. The social level and the task resolution level (i.e., the retrieval level) are therefore deeply connected.

While it builds on the tradition of analyzing the social level of information practices during and relating to play, this article focuses on player interactions with the content retrieval system, which Harviainen and Savolainen (2014) refer to as the *retrieval core* of gameplay. This is because the social aspects have already been extensively analyzed by other researchers (Harviainen and Savolainen; 2014; Harviainen and Hamari, 2015; Sköld et al., 2015; Harviainen and Vesa, 2016).

The article follows two lines of research in particular. One line is the study of games as information systems, a topic which until recently has been very much confined to game studies, not information research of any kind (see Harviainen and Savolainen, 2014). Only a handful of works have so far appeared in prominent information systems journals either (e.g., Kohler et al., 2011; the contents of *JAIS* issue 13(10), such as Goh and Wasko, 2012). These traditions have furthermore not interacted with each other.

The second line is the ongoing debate in information journals on retrieval issues that deal with increasingly complex audiovisual content. Such topics include e.g., multimedia (e.g., Torjmen-Khemakhem et al., 2013), hypermedia (e.g., Steichen et al., 2012), and the visual representation of retrieval access and results (e.g., Larsen et al., 2006; Ahn and Brusilovsky, 2013). This is an area that merits increasing study, as societies move toward more streamable, interactive, cloud-based, and ubiquitous digital content, and system types grow more varied. This article approaches its subject from the perspective of keywords, access, and retrieval, the last of which we look at next.

Play as Retrieval

Games, MMORPGs included, are simultaneously artefacts and processes. Designing the artefact that is used for play therefore affects the forms of play it makes possible (Wardrip-Fruin, 2009).

Like other information systems (e.g., Vakkari, 1999), MMORPGs consist of both a retrieval system and social systems (Harviainen and Savolainen, 2014). They exemplify Buckland's (1991) division of information systems into two types: the task and data retrieval core function as an *information-supplying system*, whereas the social level of play is a cognitive system, used for *becoming informed* (as per Shaw and Culkin, 1987).

During digital game play (including MMORPGs), people respond to challenges created by a retrieval system through code. Players are in fact just responding to algorithms (Vesa, 2013). The game interface, however, makes the situation experiential (Jørgensen, 2013). As a result, reacting to an algorithmic demon feels more like fighting a virtual demon than like answering code, and thus becomes intrinsically motivating. This is *cognitive absorption* in action (as per Agarwal and Karahanna, 2000). It takes place even as players know that the experiential elements are in many ways simply systemic tools for letting the game decide problem formulations for the players' information retrieval. The system guides problem formulation so that it results in pre-determined resolution patterns, instead of each player's focus formulation influencing retrieval (as per Vakkari, 1999). The experiential quality of all of this is a key factor in why people want to interact with such systems (Kohler et al., 2011).

In digital games, the user interface of the retrieval system is embedded in the game environment itself (Jørgensen, 2016). Its "keywords" are all game elements of some kind, either ecological (existing within the game's fictional reality) or emphatic (representations of game-internal elements through the interface, such as a health gauge). These keywords can be e.g., skills, creatures, items, and locations (Jørgensen, 2013). The experiential content of a virtual world consists of not just the virtual environment but also virtual objects, some of which provide automated responses while others function as tools (Schmeil et al., 2011). Interacting with those elements retrieves creator-inputted information from the game's coded core. That information then provides again new data access and interaction possibilities. These are, in turn, experienced as additional content and opportunities for further interaction (Jørgensen, 2016). The information is revealed at a pace intended to create strong engagement and commitment to play (Harviainen and Hamari, 2015). It follows what Larsen, Ingwersen and Kekäläinen (2006) call a "progressive revealment strategy" of

information, but control over the revelation is held by the system. The game's designers try to optimize this, usually through content flow regulation. This is where we turn next.

Optimizing Retrieval Difficulty

A key problem with information systems has for decades not been the lack of information, but rather in the ability to utilize the information (Simon, 1981). Attention, instead of information, is more often the scarce resource. The bigger in scale they become, the more games too face this issue. The popular “sandbox-type” game environments (open world games where almost everything seems possible), MMORPGs included, are unfocused information systems, even if they have a central plotline or a few. Players often use them also against designer intent, in “functional bad play” (Myers, 2010) or, in information systems terms, “adaptive use intention” (Chandra et al., 2012). Sandbox games therefore contain many incentives for going toward pre-narrated retrieval content. Doing so is more likely to provide meaningful play. It is nevertheless up to players alone to decide whether they want to follow the designer-intended course or not.

To counter this potential lack of player focus, as pointed out above, many games release their content in a controlled fashion. This way the players do not have access to too much content at once, and they therefore do not so easily lose focus or interest (Harviainen and Hamari, 2015). This feeds the game experience. It fuels uncertainty about task resolution, and even task formation and information needs (Harviainen, 2012). It is a visible instance of Brashers and Hogan's (2013) observation that in information retrieval, uncertainty does not have to be an inherently negative experience. On the contrary: when using playful systems, uncertainty is an essential part of the enjoyment.

Part of the fun of game play is that even when uncertainty is reduced for some facets of play, it is still generally maintained in some other parts. Games accomplish this by restricting some types of information but not others (Harviainen et al., 2012). Through pacing and tailoring, the relevances of the content can meet systemic, cognitive, and behavior-influencing needs. The game situation works as the context that defines content and keyword relevance, and thereby creates useful inference (as per Cosijn and Ingwersen, 2000).

The retrieval engine's organization and its access point system assist crucially in these relevance-supporting processes. For example, only by interacting with a certain non-player character will a player be granted access to the content (and thus retrieval options) of a particular quest (Harviainen and Hamari, 2015). Each gameworld is created to supply information that emphasizes the game experience desired by its designers (Jørgensen, 2013). Its access points have therefore been carefully selected to facilitate play and to keep up engagement. Where one is at a particular moment in the game world, together with the game's interface structure, determines what types of retrieval are made possible.

This is what sets MMORPGs centrally apart from many other information retrieval engines. Their content access is limited by not only user privileges and rank, but also by which "buttons" and "drop boxes" are available (or missing) on each "page". The experiential interface of a game turns these hindrances into a meaningful, enjoyable process, whereas a similarly inefficient real-world information system would only create complaints. MMORPG use can thus be described as a kind of playful balance between goal-oriented task-based retrieval (e.g., quests) and retrieval by browsing, i.e., the exploration of the game environment (as per Steichen et al., 2012).

Task complexity directly affects information seeking, including the use of retrieval systems (Byström and Järvelin, 1995). A typical digital information system seeks to provide its users results that are as efficient as is possible. In contrast, game content retrieval systems are intentionally difficult to use (Harviainen and Hamari, 2015). This is because enjoyable gameplay derives from artificial but interesting limitations (Suits, 1978; Salen and Zimmerman, 2004). Optimization of challenge level is one of the crucial design issues of games (Carlson and Misshauk, 1972). When the challenge level is optimal to skill, play is enjoyable. In information systems terms, these games' Perceived Usefulness (as per Davis, 1989) relies on an optimized challenge level, between boredom caused by either ease or excessive difficulty. The interface should thus be easy enough to use, but the retrievable content sufficiently challenging. People are satisfied with the results of their retrieval, even as those with more skill in handling the systems will gain more or better results than novices. This is a phenomenon found in non-playful information retrieval as well (e.g., Al-Maskari and Sanderson, 2011).

While players may perform information *seeking* tasks on behalf of each other (Harviainen and Savolainen, 2014), *retrieval* tasks remain personal. This is mostly because of interface limitations and the structure of play itself. Exceptions to this rule exist, in the form of large encounters where groups of players together fight a key foe such as a virtual dragon (Vesa, 2013). Players train for those tasks together, exemplifying Hansen and Järvelin's (2005) observations about information retrieval for collaborative purposes (Harviainen and Savolainen, 2014): people retrieve information mostly alone, but then share not just findings, but also expertise and even personal experiences.

This is in line with known information systems usage (e.g., Land, 1987): people tend to use the systems by themselves, but for purposes of later sharing, instead of hoarding, what they find. The collaborative, interpersonal nature of MMORPG play tends to strengthen this likelihood

(Harviainen and Savolainen, 2014). The systems themselves thus encourage information seeking by proxy (as per McKenzie, 2003) in shared contexts, even as the primary retrieval tasks are by necessity individual work. Task complexity usually reduces the use of specific information sources in favor of more generic ones (Byström and Järvelin, 1995).

Learning to read and use the game environment is a key part of the so-called *procedural literacies* that players develop during play in order to navigate the complex environments described above. A procedural literacy is the ability to analyze the system with which one is interacting, and to compare it to other systems, including the “real” world (Bogost, 2007). This is a segment of the domain information of the game (“relevant known facts” of the situation, as per Byström and Järvelin, 1995). Procedural literacy is required, alongside information about the game’s internal challenges (“problems”, in information terms) and potential solutions (“problem-solving information”), for functional play. To utilize the game environment successfully, players furthermore have to rely also on existing knowledge structures and the information that they bring into play from the outside (Crookall et al., 1987). This is typical for information systems, which practically always require the user’s own information to make cognitive engagement happen and to make task-based retrieval successful (Ingwersen and Järvelin, 2005). Next, after a section on methodology, we turn to examining how these processes function together, through the application of the hypothesis of play-as-retrieval on an ethnographic dataset.

Methodology

This article uses an ethnographic approach to its topic: the understanding of parts of MMORPG gameplay as information retrieval and information system use, as well as the implications thereof. The data set was gathered by [second author] in three segments during October 2012-September 2016 from one of the most popular MMORPGs in the world, *World of Warcraft* (WoW), for the primary purpose of studying why players found their play rewarding (Rapp 2017a; 2017b; 2017c).

The fieldwork followed a reflexive approach, exploring the ethnographer's experience together with that of other participants (Cardano, 2009; Rode, 2011; Van Maanen, 2011). Differently from the 'realist teller' of the "objective" ethnographies, reflexivity paints the observed reality from the ethnographer's subjective point of view (Van Maanen, 2011). It adopts an auto-ethnographic stance where the fieldworker's perspective is considered an important part of the collected data set (Tedlock, 1991).

[Second author] played extensively two expansions of the game, *Mists of Pandaria* and *Warlords of Draenor*, along with their patches. He achieved the maximum level of experience (100) with his main character, belonged to a variety of guilds, and played almost all the quests, dungeons, and raids (collaborative missions) present in the game. He also optimized his character, learnt professions, farmed (i.e., collected resources for raids) and crafted (i.e., created items from raw materials).

The data set included diverse materials: 1. WoW related documents (e.g., forum posts, fandom websites, game guides); 2. data collected during more than 1200 hours of participant observation in WoW (e.g., chat log of informal conversations with players, screenshots, notes on the players' behaviors and dynamics, a diary with the ethnographer's experiences and reflections); 3. formal interviews (n=36) carried out both in the WoW's world (18) and in the real world (18), involving players at different levels of engagement in terms of experience of play, frequency of play and social centrality.

Observation was performed mainly in an Italian PvE (Player vs Environment) server, where players cannot fight each other in the common areas of the game. To enlarge the heterogeneity of the investigated phenomena, 150 hours of observation were conducted in an Italian PvP server as well,

in which players can fight each other practically everywhere. Observational notes, personal experiences, and reflections were written down and then reviewed daily, immediately after the completing of a game session. Informal conversations were collected using the WoW chat log. Players belonging to the ethnographer's guilds were always aware of the scope of the research and that their conversations could be recorded, although the researcher did not constantly remind them about it. Interactions with players casually encountered during game actions, instead, were recorded without asking their explicit consent: however, personal information was removed from the data set, in order to ensure anonymity.

The sample of the formal interviewees was split in: A. hardcore gamers (maximum level, more than 20 hours of play per week and more than 2 years of play experience) (16); B. normal players (80-100 level, 10-20 hours of play per week and more than 6 months of play experience) (9); C. novices (30-90 level, less than 10 hours of play per week and less than 6 months of play experience) (9). To take into account the process of game abandonment, two players who quit WoW before the beginning of the study were included as outliers. Participants were enrolled both in a PvE server (26 out of 36) and in a PvP server (10 out of 36), exploiting the ethnographer's in-game social networks (23 out of 36), or being selected in a pick-up group during the accomplishment of a dungeon (13 out of 36) after a screening interview. The first method allowed for the selection of profiled participants: the ethnographer's most experienced game companions ensured support for the research of specific profiles, guaranteeing their representativeness. The second method, instead, increased the sample heterogeneity, by including participants that were not foreseen before, through a serendipitous approach. The decision to stop interviewing at 36 participants came when the ethnographer became aware that supplementary data would not have produced significant new results for the research objectives, thus following a data saturation criterion (Bowen, 2008).

Hardcore gamers were considered key informants: therefore, they represent the most conspicuous part of the sample. They were further split in *leaders*, masters or officers who have an important social role in their guild, and *followers*, players with no responsibilities in their guilds. To strengthen the representativeness of the sample, we also took into account the participants' game "race", class and main role (dps=16, tank=10, healer=10).

Interviews lasted around three hours each, and were registered using an audio recorder or the WoW's chat log. The questions were defined on the basis of the ethnographer's personal experience in the game, as well as the informal conversations he made during the fieldwork. Participants were free to talk of the game aspects they considered more important and to explore topics not foreseen in the initial list of questions. Interviewees were not compensated for their participation. Players' names, as well as the ethnographer's character name, have been changed for privacy reasons.

Data analysis followed a thematic analysis, using open and axial coding techniques (as per Strauss and Corbin, 1990), and was originally done for the topic of rewards. For the purposes of this article, the data set was used to look for instances of play as retrieval. Data analysis focused on the whole data set (observational data, the ethnographer's diary, informal conversations, formal interviews, and WoW related documents), reviewing the previously developed codes. Whereas the most part of the previously defined codes were maintained, new codes were also developed to match the new research questions. All the codes were categorized in overarching themes, employing affinity diagrams: then, themes were reviewed and finally named.

While this article focuses on retrieval from information systems, we like Vakkari (1999) emphasize the fact that outside of singularly analyzed individual actions, information retrieval is rarely an isolated activity. It is a part of a wider context. For the purposes of understanding how players

interact with the retrieval core, however, we have temporarily left out the wider context in this article. We cite the nuances of the social level of play, and influences from external information sources, here only in situations where we have observed them directly affecting play-related retrieval. We nevertheless acknowledge that content retrieval in MMORPGs is, to a large extent, in fact a social activity. It exemplifies Hansen and Byström's (2005) concept of *collaborative information retrieval* and many parts of Shah's (2012) *collaborative information seeking*. As pointed out by Harviainen and Hamari (2015), it is an artificial limitation to study content retrieval as a social activity, yet without taking into account social influences on it. We nevertheless do so here, creating those artificial limitations, in order to demonstrate how the retrieval task processes actually function – and to avoid overlap with already existing research on play's social level (e.g., Harviainen and Savolainen, 2014).

In the following sections, we focus on three facets of MMORPG play, as examples of how information retrieval takes place in them: the systems aspect of *Controlled Access* (explored in a social context by Harviainen and Hamari, 2015), the retrieval-skill related *Procedural Literacies* (defined by Bogost, 2007, based on Gee, 2007), and *Emphatic Keywords* and their related add-ons (based on Jørgensen, 2013; 2016). The purpose of this is to especially illustrate how closely related MMORPGs are to database systems in interaction, once one understands that the content retrieval just takes place through visual, experiential “keywords” rather than written ones.

Findings

In the preceding sections, we have discussed the hypothesis of MMORPG play being a kind of experiential information retrieval, supported by the interface, the various types of “keywords”, and processes such as the development of procedural literacies. This previously discussed lens is now applied to an ethnographic data set collected in *World of Warcraft*. Through this renewed

perspective, new data and interpretations emerge, producing novel insights on how design, information and players are tied together. The analysis focuses on three main themes: controlled access, procedural literacies, and emphatic “keywords”. All direct quotes below come from respondents in the data set.

Before starting to outline such themes, however, we briefly describe how WoW functions as an information retrieval system. Basically, WoW is a fantasy game that provides its players with a series of “quests”, which are missions that have to be accomplished in order to progress in the game. Once a quest is accepted, the game retrieves a series of challenges, made of puzzles to be solved or monsters to be defeated, to which players respond. This also happens when players decide to enter in an instance (a special play zone separate from the main area) or raid (coordinated group operation against a major foe): here, however, they take part in social information practices and collaborative information retrieval, since to defeat monster present in there they have to cooperate in small groups or being part of structured social organization, i.e., the guilds. To be successful in such endeavors, WoW players also leverage a variety of external information resources, such as third-party applications (like askmrrobots.com), guides (e.g., <https://www.icy-veins.com/wow/>), and forums (<https://eu.battle.net/forums/en/wow/>).

Controlled Access

As described above, many games guide problem formulation for the players’ information retrieval, as well as release their content in a controlled fashion. This theme could be seen, at a first glance, as a restriction of players’ freedom in seeking the information they would like to gain. However, WoW shows that it is possible to tunnel the players’ experience while at the same time supporting their sense of autonomy. When they enter the game for the first time, players need to level up as fast as possible. [Second author] personally experienced during the fieldwork how the first phases of the

game are devoted to better his character: the game retrieved contents matching his skills so that he could steadily progress without being frustrated. This mechanism has been confirmed by almost all the novices interviewed during the ethnographic work (8 out of 9). Macross, for instance, who was still a beginner in WoW, reported: *“I need quick responses to my answers, any diversion is a waste of time”*; whereas Elys added that *“You cannot join dungeons that are not suitable to your character... I think that it’s a help more than a limit, otherwise there would be so many things to do that I wouldn’t know where to start from...”*. This opinion about the usefulness of the game’s restrictions is shared among normal players (5 out of 9) and hardcore gamers (13 out of 16). Remembering his first experiences in WOW, Ilynx, a hardcore gamer, confirmed that *“The game immediately reacted to any progression of my warrior by providing slightly more difficult quests to be accomplished, so that I was always striving for bettering myself to keep the pace. This was clearly a good thing, since you can perfect your character without getting lost in Azeroth”*. Novices welcomed a design that discourages the exploration of areas that are not tailored to their character’s skills, as well as the presence of chained quests that drive them toward a specific direction. This helps in optimizing the challenge level, focusing players on the retrieval tasks that are most suitable to their abilities.

Unveiling the game contents step by step, without providing everything at once, on the one side produced a positive feeling of uncertainty in players. On the other side, it made players feel like they were progressing in the game: *“What I enjoy most in this game is that many quests are linked together, but you can’t know how many of them you will have to succeed to get the big prize...”*, said Mina, reporting a sensation shared by most of the interviewed novices (7 out of 9). Nevertheless, players always had the possibility of accessing new zones, even those that were not adequate for their level. Tyran, for example, recounted that he sometimes ventured in places only to see how they look like, which often resulted in a sudden death: he nevertheless enjoyed this activity since he

could “*explore what I want*”. The practice of venturing “out there” was shared by more than half of the interviewed novices (5 out of 9), and the enjoyment coming from it was confirmed also by the ethnographer’s personal experience. He spent almost one day a week to explore areas that were far more difficult than those suitable for his mage. This always turned in his mage’s death, but he started tracing a map of Azeroth, discovering how that world was carefully designed.

As the players’ experience grew, their need of freedom also became more pressing. WoW satisfies such needs by providing an overabundance of quests and different opportunities of play alternating goal-oriented retrieval and retrieval by browsing. As a result, players had the sensation of being in a world full of opportunities, where they, nonetheless, could always “find their way back” by returning to quests, dungeons and raids that offered a more controlled interaction and thus a “safer” game experience. Tera highlighted this: “*Sometimes you need to wonder around, while other times you want to be driven by the game, letting it guide you to the next stage...*”, whereas Uldar added “*having specific objectives to pursue is reassuring for me, especially when I play alone*”. The need of safety was more relevant for normal players (5 out of 9), whereas almost all the hardcore gamers (13 out of 16) agreed that the sense of freedom experienced while playing is one of the main motivation to keep playing WoW: Neyr, for instance, specified that “*Sometime I want to go fishing, sometimes combat for obtaining something, other times just want to wonder around, losing time, joking, chatting... I can do everything*”; while Erwin stated: “*WoW is a game that you can play at different level of complexity. It’s free and open and everyone lives the game as she likes and plays it as she wants*”.

Looking at WoW as an information retrieval system, therefore, allows us to see how many sensations players experience in the game. Experiences such as progression, autonomy, freedom,

discovery, and safety can be shaped through a controlled release of information, as well as by balancing task-based retrieval and retrieval by exploration.

Procedural Literacies

The second point is related to WoW-players' procedural literacies. As highlighted earlier, to use the game environment successfully, players need to gain information about the game's challenges and potential solutions. WoW players can rely on a huge amount of information placed both within and outside the game world. Whereas a galaxy of related websites and forums debates practically every aspects of the game, a series of social practices established in the WoW's guilds embed the knowledge on how to face game problems. These are key parts of the external and social information systems described earlier.

What is most interesting, however, is that WoW presents two peculiar ways for developing procedural literacies. First, players can rely on "mentors", skilled players that have the role of transmitting relevant known facts to novices, representing a reference point for a specific class within a certain guild. [Second author] acquired most of the knowledge about his main character by asking mentors to tune its gear in different phases of the game. He then became a mentor himself when he reached a sufficient understanding of the abilities of his mage.

Mentors were recognized for their expertise. Giving help may become a means to gain reputation. This frames mentorship in a utilitarian perspective, where information is given to obtain something in exchange. During the fieldwork, [second author] interviewed 13 hardcore gamers (out of 16) who became guides for their guilds almost one time in their personal history as players: most of them (10 out of 13) pointed out that along with the opportunity of expressing an altruistic attitude, mentorship brings on immaterial rewards. Crane, for instance, explained: *"Helping the noobs has its advantages. I'm now renowned also outside my guild, and it's a pleasure to see that many players*

come to ask me suggestions on what they should do to become more powerful"; while Vania added that *"becoming a guide means that you start being respected more by the others, you become the reference point for your class, and you can influence your companions, shaping somehow the life of your guild"*. An emphasis on information-related power was recurrent in informants' discourses (9 out of 13), even if it was not always explicit: *"I like to be useful to my community to help others, but if you want my advices you must follow them word for word"*, said Enea, a hardcore gamer with more than 5 years of experience in WoW.

Second, the interviewed players (8 out of 9 normal players as well as all the hardcore players) were used to experimenting with different in-game choices (e.g., gear selection, skills development) and assessed their impact on their characters. In terms of information retrieval, this is as a way of making specific queries to the system on how to be more effective in the game, evaluating the correctness of its responses directly in the field. Players can employ external resources to achieve such goal: tools like "Ask Mr. Robot" recommend the optimal equipment for a certain character given its stats priorities and abilities. Herik, for instance, explains that *"When you find a new item you can access askmrrobots and see whether this new piece works better than what you have, because you have to look at how your stats are affected by what you found... not necessary a more powerful item has a better outcome in terms of damages"*. The ethnographer himself used a variety of third-party applications to optimize his character, learning to set its stats priorities with the help of automated tools. Moreover, all the forums and wikis devoted to explaining how WoW should be played recommended using such tools, in order to optimize damages per second, healing power, and so forth.

However, the most experienced interviewees (10 out of 16 hardcore players) emphasized that there was not a unique and optimal answer to such queries, and that a part of the game fun was to

continuously search for new answers, testing during play: *“It took me months to experiment every possible combination of items and increase the damage of my warrior above the standards... Now my dps [damage per second] is more powerful than ever, and I am very proud of it. But I keep exploring, because what I enjoy most is to find the next equipment, the one that no one thought before”*, said Kairo, exemplifying the pleasure of seeking discovery and pursuing mastery, which most of the hardcore gamers (10 out of 16) experience while playing. Part of the players’ enjoyment, therefore, lies in finding new questions, novel ways of assembling what they know, and observing the answers they produce. Those sometimes turn into something unexpected: *“I discovered this [a combination of gear] by chance, actually I was looking for something else”*, said Herik.

This article’s lens on the one hand allows a look at how players learn to play also in terms of power relationships. Becoming an expert of certain aspects of the game is a way for gaining respect and exerting control over other individuals, by being a gatekeeper of certain information. On the other hand, it also highlights that players do not strive for complete efficiency and do not pursue an “ultimate answer” capable of solving all their in-game problems. Instead, they enjoy the process of formulating new questions, retrieving temporary answers, and chancing upon unexpected solutions (a type of information encountering, as per Erdelez, 1999).

Emphatic Keywords

The third theme is how a game like WoW provides players with different “keywords” to retrieve information. In WoW, while the ecological keywords (existing within the game’s fictional world) are substantially stable and cannot be modified by players, emphatic ones (elements of the game interface; Jørgensen, 2013, 2016) can be expanded through a series of add-ons. Such tools basically transform the game interface, allowing the retrieval of information that is otherwise unreachable.

Omen, for example, enables players to see the values of their own group members' threat level on enemies, so that they can recognize when they are in danger of pulling the enemies' attention. Other mods (i.e., add-ons, in the game jargon), in turn may for example make visible a players' performance, such as the damages caused by each in a fight, allowing for a thorough evaluation of the abilities in a given group: Enea observed that "*they [the mods] provide criteria for establishing who will play in the next raid.... Stats don't lie*". All the interviewed hardcore gamers and most of the normal players (7 out of 9) stressed that such instruments are essential to play the game at its best. Abraxas, a hardcore gamer, explained how such tools are used by all the experienced players: "*You cannot succeed in a raid without knowing who is generating aggro or how much damage the dps in your group are doing... All the expert guilds need supplementary information source in real-time during raids, it's paramount to defeat the hardest bosses... We use mods also to distribute loot [...]* Usually, in a raid, my officers and I monitor our companions' behaviors and check at battle stats to distribute drops among us. The better you play, the more likely it is you'll have the item you want". The ethnographer himself became aware of the need of installing add-ons when his guild companions required him to do so. Otherwise it would have not been possible for him to play with them in raids.

While the basic interface of WoW limits the information available to players, add-ons expand the types of retrieval that are possible within the game. They expose players to a constant flux of supplementary information that widens their knowledge of what is happening in the game world and what is being retrieved from the core. Even if the "official" version of WoW does not provide such means, they are more than just permitted in the game. They represent an essential tool for facing the hardest battles (raids), where the constant monitoring of real-time information about players and monsters is a prerequisite for achieving success. Here, add-ons establish a state of pervasive visibility, where players completely expose their "own information" to others. This is

pressing especially for novices (7 out of 9) and normal players (5 out of 9) who feel they are always under examination. Uldar, for example, expressed what the majority of novices thought about such exposure: *“This completely exposes you to the judgments of the others... It pushes to better your performances, but it’s like to be naked”*; whereas Vega confirmed to be *“often ashamed of how I played, because everyone can see my performance, and this isn’t comfortable especially in the first stages of the game, when you don’t know how to play. I often get insulted... sometimes they kick me out the group”*.

In terms of information systems, WoW makes available (even if not directly) an endless number of emphatic keywords that get the players closer to the retrieval core’s algorithms, somehow allowing their modification. Players can thereby develop their own keywords by creating new add-ons and then using them in the game. Two of the interviewed hardcore gamers, who represented the most experienced players of the sample, developed mods to satisfy the idiosyncratic needs of their guilds. Looking at games as information systems further points to how manipulating the information available may impact players’ in-game performance, but it may also establish new forms of mutual control.

Discussion

As has been discussed in this article, functional gameplay depends on optimal yet at the same time restricted access to retrieval tasks. It also requires the skills needed to complete the retrieved challenges, i.e., to play well. Information systems typically have three often overlapping facets with different purposes (Buckland, 1991). The *cognitive system aspect* leads to users becoming informed, by providing the required information and by connecting with the user’s prior knowledge and skills. *Managerial systems aspects* function as tools for allocating information and resources, and are judged by the quality of the system and the benefits of its use. The *economical aspect*, in

turn, determines whether potential users have a possibility of seeing interaction with the system as worthwhile. An information system can be considered economical if at the same time 1. its perceived benefits exceed its expected costs of use, 2. it is more attractive than alternative options are, and 3. the user considers the task continually worth resolving. (Buckland, 1991, p. 159). In the case of voluntary play, “worthwhile” usually of course equates with “enjoyable, or at least interesting, to do”. This is reflected in our interviewees’ answers, in which the word “enjoy” in its various forms keeps popping up in many contexts

MMORPGs seek to simultaneously accomplish functionality in all three of the system aspects, by involving players in retrieval tasks that get their context from the social level of play. Parts of the economical system aspect are hidden. They are embedded in how well the retrieval, political, and managerial aspects of the system function. Other parts of the economical aspect are in turn explicitly visible, as parts of the ecological and emphatic interface elements of the gameworld (Jørgensen, 2016).

Games can be efficient and elegant in their inherent, intentional inefficiency. They can increase reflection and foster playful drive towards performing work-like tasks (e.g., Warmelink, 2014). Such advantages cannot however be directly carried over into other environments, at least not without accompanying them with relevant social changes (Vesa et al., 2017). Games furthermore do not only retrieve information - they collect it. Many online games are in fact double-function retrieval engines: while providing experiences for the players, they also gather data on the players themselves, for monetization - and sometimes also exploitation (e.g., Lehdonvirta and Castronova, 2014). This is part of their appeal, as well as a challenge.

Conclusions and Implications

This article has explored the question “how do multiplayer digital games function as information retrieval systems?” In MMORPGs, information retrieval is a pre-arranged formulation of search focus, implemented by the game in its function as an information system. By fostering contextual relevances through processes such as controlled content access, multiplayer games guide their players to perform information retrieval tasks. The interfaces of the games make these retrievals mostly individual-level actions, even in group situations. The players nevertheless turn the results of many retrieval tasks into collaborative, shared work.

Theoretical implications

As they playfully act in the context of the game, people constantly engage in information retrieval. Game design can therefore be perceived as a kind of optimization of content retrieval and distribution. In it, factors such as a developing a pace that maintains player interest, and the creation of sufficiently experiential “keywords”, are crucial. Because MMORPGs do not seek complete efficiency (in the traditional sense), but rather an enjoyable inefficiency and a positive challenge in their use, they present a fascinating case of information systems. Users expect their Perceived Ease of Use (as per Davis, 1989) to reach only some parts of the play. Good MMORPGs are efficient in retrieving the content that they should (e.g., the game interface works as well as possible; monsters appear where they should), and “inefficient” in granting access to the totality of their content. MMORPGs, as information systems, acquire therefore a new kind of efficiency, in being *efficient as games*.

By delving further into MMORPGs on the retrieval system level, we can gain crucial insight on user requirements in those search and retrieval tasks where the goal of the user is not necessarily on acquiring the best information, but rather the information that is as situationally relevant as possible.

The enjoyable inefficiency is a key part of what makes a game a game, and what makes games engaging. This article has presented a perspective on how that process functions. More empirical research needs to be conducted on this borderline, well beyond our ethnographic data set from WoW. The research should be in-depth, and conducted on individual games. That will enable us to understand not just how to design games better, but also to find out if inferences in other information retrieval contexts are similarly affected by their users' interest in having access to just some parts of the information at a time.

MMORPGs and other online multiplayer games also lead us to re-explore what exactly is “optimal access”. Both information research and information systems science have traditionally placed it on a balance between getting as much useful information as possible and the ability to avoid information overload (e.g., Davis and Olson, 1984; Ahituv and Neumann, 1987; Harviainen et al., 2012). Game studies, in turn, has been more keen to talk about restrictions that foster fair play, such as the forbidding of certain modifications, system hacks (such as seeing opponents through walls; Consalvo, 2007), or unsanctioned add-ons (Prax, 2016) that create an information asymmetry (an “unfair advantage”). Users, in turn, may have very differing requirements, expectations and desires for virtual world veracity and their ease of use (e.g., Nardon and Aten, 2012). All these remind us that information retrieval, if reduced to a mundane, routine task by immediate and too easy information availability, soon becomes boring.

Practical implications

The observations of this article point to the relevance of seeking further knowledge on games as information systems. It appears that user engagement can be increased by meaningfully optimizing both access to content and the way in which that access is restricted, provided, and arranged.

MMORPGs furthermore demonstrate that information systems need what Buckland (1991) calls the

economical aspect, that which makes their use meaningful and interesting. It is needed in addition to the advantages of an optimal managerial aspect that enables players to handle information in the best way possible.

As we design new information systems, we need to pay heed to the knowledge that easiest access to information is not always the option preferred by users. An optimal access is required, one that makes the use of the information system meaningful. System use has to be efficient on the managerial, task resolution level, while enjoyably (and only enjoyably) challenging on the cognitive and economical aspects. Game design can thus also gain much knowledge on how to improve play experiences, by looking at its own systems from an information retrieval perspective.

Finally, it bears noting that the popularity of digital games means that when they eventually enter the workforce, the young of today have already been playing games for a long time. So have their parents, and both groups continue to do so. This means that games may now be the information systems with which many people are by far the most comfortable. Therefore, if we want to provide them with the information systems from which they will benefit the most, we will have to look into the ways in which games create meaningful interactions with information. Even as people may wish to separate work from play, they nevertheless tend to use the tools with which they are most familiar. They use the same cell phone, for example, for communication, online browsing, and gameplay. It is thus up to us to make sure that the information systems we design fit their cognitive needs.

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ⁱ With definitions of what exactly counts as a game (or play) being always tautological (Suits, 1978), we for this article define MMORPGs as “*a type of online [role-playing] game that takes place in virtual worlds, with active player bases ranging from tens of thousands to millions*” (as per Harviainen and Hamari, 2015) and game play as a “probably enjoyable ludic process of interaction with a game”.